

Yan Zhuang

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Appointments

(Last Updated: August 19, 2018)

Davidson College , Davidson, NC Assistant Professor of Mathematics and Computer Science	2018–present
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Education

Brandeis University , Waltham, MA Ph.D., Mathematics Dissertation: <i>Noncommutative Symmetric Functions and Permutation Enumeration</i> Advisor: Ira M. Gessel	2013–2018
Goucher College , Baltimore, MD B.A., Mathematics and Philosophy. <i>Summa cum laude</i> . Phi Beta Kappa. Departmental Honors in Mathematics and Philosophy.	2009–2013

Research Interests

Enumerative and algebraic combinatorics: permutation enumeration, permutation statistics, permutation pattern avoidance; symmetric functions, quasisymmetric functions, noncommutative symmetric functions; combinatorial Hopf algebras.

Papers

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- Shuffle-compatible descent statistics and quotients of quasisymmetric functions**, with Ira M. Gessel.
Séminaire Lotharingien de Combinatoire 80B: Article #5, 12 pp., 2018. [[Link to S.L.C.](#)]
 - Shuffle-compatible permutation statistics**, with Ira M. Gessel.
Advances in Mathematics 332: 85–141, 2018. [[arXiv:1706.00750](#)]
 - A generalized Goulden–Jackson cluster method and lattice path enumeration**.
Discrete Mathematics 341(2): 358–379, 2018. [[arXiv:1508.02793](#)]
 - Eulerian polynomials and descent statistics**.
Advances in Applied Mathematics 90: 86–144, 2017. [[arXiv:1610.07218](#)]
 - Counting permutations by runs**.
Journal of Combinatorial Theory, Series A 142: 147–176, 2016. [[arXiv:1505.02308](#)]
 - Logarithmic representability of integers as k -sums**, with Anant P. Godbole, Samuel Gutekunst, and Vince Lyzinski.
Integers: The Electronic Journal of Combinatorial Number Theory 15A: Paper #A5, 15 pp., 2015.
[[Link to Integers](#)]

2. **Counting permutations by alternating descents**, with Ira M. Gessel.
Electronic Journal of Combinatorics 21(4): Paper #P4.23, 21 pp., 2014. [Link to E.J.C.]
1. **Shattering thresholds for random systems of sets, words, and permutations**, with Anant P. Godbole and Samantha Pinella.
Pure Mathematics and Applications 24(2): 125–142, 2013. [Link to PU.M.A.]

Presentations

(Presentations listed under the same title may not have had the same title, but covered roughly the same material.)

Invited Research Talks

- **Shuffle-Compatible Permutation Statistics**

- *Combinatorics Seminar*, University of Southern California, Los Angeles, CA Apr. 2018
- *Combinatorics Seminar*, University of California San Diego, La Jolla, CA Apr. 2018
- *Combinatorics Seminar*, University of Washington, Seattle, WA Feb. 2018
- *Algebra and Combinatorics Seminar*, DePaul University, Chicago, IL May 2017
- *Combinatorics Seminar*, Massachusetts Institute of Technology, Cambridge, MA Apr. 2017
- *Combinatorics Seminar*, Dartmouth College, Hanover, NH Apr. 2016

Contributed Research Talks

- **Homomorphisms on Noncommutative Symmetric Functions and Permutation Enumeration** July 2018
16th International Conference on Permutation Patterns
Dartmouth College, Hanover, NH
- **Shuffle-Compatible Permutation Statistics**
 - *AMS Contributed Paper Session on Partitions, Paths, and Permutations* Jan. 2018
2018 Joint Mathematics Meetings, San Diego, CA
 - *26th British Combinatorial Conference* July 2017
University of Strathclyde, Glasgow, Scotland, UK
 - *14th International Conference on Permutation Patterns* June 2016
Howard University, Washington, DC
 - *Graduate Student Combinatorics Conference 2016* Apr. 2016
Clemson University, Clemson, SC
- **Peaks, Descents, and Pattern Avoidance**
 - *15th International Conference on Permutation Patterns* June 2017
Reykjavík University, Reykjavík, Iceland
 - *Graduate Student Combinatorics Conference 2017* Apr. 2017
University of Kansas, Lawrence, KS

- **The Goulden–Jackson Cluster Method for Monoid Networks and an Application to Lattice Path Enumeration** Aug. 2015
8th International Conference on Lattice Path Combinatorics and Applications
California State Polytechnic University, Pomona, Pomona, CA
- **The VC Dimension of Random Set Systems, Word Sets, and Permutation Sets** Jan. 2013
AMS Session on Combinatorics, I
2013 Joint Mathematics Meetings, San Diego, CA

Contributed Research Posters

- **Shuffle-Compatible Descent Statistics and Quotients of Quasisymmetric Functions** July 2018
30th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC), Dartmouth College, Hanover, NH

Invited Talks for an Undergraduate Audience

- **Counting Permutations Using Valley-Hopping**
 - *Math/Stat Colloquium*, Swarthmore College, Swarthmore, PA Feb. 2018
 - *Special Seminar*, University of Hartford, West Hartford, CT Feb. 2018
 - *Math Colloquium*, Hamilton College, Clinton, NY Feb. 2018
 - *Math/CS Coffee*, Davidson College, Davidson, NC Feb. 2018
- **Combinatorics, Generating Functions, and a Permutation Counting Problem** Sept. 2014
Special Seminar, Goucher College, Baltimore, MD

Local Talks

- 1 *Special Seminar* talk (for an undergraduate audience), Brandeis University Jan. 2018
- 7 talks given at the *Combinatorics Seminar*, Brandeis University 2014–2018
- 6 talks given at the *Graduate Student Seminar*, Brandeis University 2014–2017

Selected Conferences

- 2019 Joint Mathematics Meetings (upcoming) Jan. 2019
Baltimore, MD
- MAA MathFest 2018 Aug. 2018
Denver, CO
- 30th International Conference on Formal Power Series and Algebraic Combinatorics (FPSAC) July 2018
Dartmouth College, Hanover, NH
- 16th International Permutation Patterns Conference July 2018
Dartmouth College, Hanover, NH

- 2018 Joint Mathematics Meetings Jan. 2018
San Diego, CA
- 29th International Conference on Formal Power Series and Algebraic July 2017
Combinatorics (FPSAC)
Queen Mary University of London, London, England, UK
- 26th British Combinatorial Conference July 2017
University of Strathclyde, Glasgow, Scotland, UK
- 15th International Permutation Patterns Conference June–July 2017
Reykjavík University, Reykjavík, Iceland
- 14th International Permutation Patterns Conference June 2016
Howard University, Washington, DC
- 8th International Conference on Lattice Path Combinatorics and Applications Aug. 2015
California State Polytechnic University, Pomona, Pomona, CA
- 12th International Permutation Patterns Conference July 2014
East Tennessee State University, Johnson City, TN
- Stanley@70 June 2014
Massachusetts Institute of Technology, Cambridge, MA

Teaching

Davidson College

- MAT 340: **Probability** Fall 2018
- MAT 320: **Combinatorics** Fall 2018

Brandeis University

- MATH 14b: **Cryptology** Fall 2017
Self-designed one-time course offering.
- MATH 8a: **Introduction to Probability and Statistics** Summer 2016
- MATH 10a: **Techniques of Calculus (a)** Fall 2015, Spring 2016
- MATH 298a: **Independent Study** Summer 2015
Special independent study in Linear Algebra for a M.A.T. (Master of Arts in Teaching) student.
- MATH 10b: **Techniques of Calculus (b)** Fall 2014, Spring 2015

MIT PRIMES (High School Research Program)

- Richard Zhou (Lexington High School) 2017
Supervised research project in permutation pattern avoidance.

Teaching Workshops and Other Activities

- Project NExT at MAA MathFest 2018**
 Attended workshops on tactile learning, teaching proofs, community outreach, mastery-based grading, and undergraduate research.

July–Aug. 2018
- Pedagogy Workshop**
 Graduate School of Arts and Sciences, Brandeis University, Waltham, MA

May 2018
- Graduate Students with Teaching Responsibilities (Workshop Series)**
 Center for Teaching and Learning, Brandeis University, Waltham, MA

Jan.–May 2017
- Teaching Innovation Grant: Flipping the Calculus Classroom**
 Worked with Rebecca Torrey (PI) to implement a partial flipped classroom structure in Brandeis University calculus classes.

Aug. 2015–May 2016

Selected Awards and Honors

National

- Project NExT Fellowship**
2018–2019

Brandeis University

- Jerome Levine Thesis Prize**
 Awarded annually to a graduate student in the Mathematics Department for an outstanding Ph.D. dissertation.

2018
- University Prize Instructorship**
 Awarded \$6,000 by the Graduate School of Arts and Sciences to design and teach an undergraduate course in cryptology.

2017
- Outstanding Teaching Fellow Award**
 Awarded annually to best graduate student instructors in the Graduate School of Arts and Sciences.

2016
- Graduate Student Teaching Prize**
 Awarded annually to a graduate student in the Mathematics Department for skill and dedication in teaching.

2015

Service and Professional Activities

Profession

- Co-organizer**, Project NExT Session: *Mentoring Undergraduate Research for Beginners*, 2019 Joint Mathematics Meetings

2019
- Referee** for the following journals:

2018–Present
 - *Advances in Applied Mathematics*
 - *Electronic Journal of Combinatorics*

– *Journal of Combinatorial Theory, Series A*

- **Reviewer**, *Mathematical Reviews* 2018–Present

Davidson College

- **Faculty Speaker**, International Student Pre-Orientation 2018
Spoke to incoming international students about social identity, belonging, and mental health.

Brandeis University

- **Co-organizer**, Combinatorics Seminar 2016–2018
- **Workshop Faciliator**, Mathematics Department Teaching Practicum 2016
Developed and facilitated a teaching workshop for graduate student instructors on the topic of countering stereotype threat in the classroom.
- **Panelist**, Mathematics Department Introductory Graduate Student Panel 2014, 2015, 2017